Malting Barley

in

Western Canada

PRODUCTION
HARVESTING
THRESHING
MARKETING

PUBLISHED BY

SEARLE GRAIN COMPANY LIMITED

Acknowledgments

We wish to acknowledge, with thanks, the valuable assistance given by the following individuals and the institutions they represent without whose helpful advice the production of this bulletin on "Malting Barley" would not have been possible.

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Foreword

AT ONE TIME, relatively unimportant in Western Canada except as a feed grain for domestic use, barley to-day is a major commercial crop in the production of which more and more prairie farmers are becoming actively engaged. Of particular significance, however, is the fact that a fairly substantial portion of the barley which enters commercial channels is now bought by the malting companies, shippers or milling trades on a premium basis and that these transactions carry with them over-the-quota privileges which provide an important source of ready cash.

It is to the breeding, testing and production of this special type of barley that a great deal of effort has been put forward in recent years. Concurrent with this effort, there has appeared in print, from time to time, much valuable information designed to assist growers of malting and milling type barley in the special task to which they are devoted. It is our sincere hope that the publication of this bulletin will serve to bring together some of the more important facts, as well as some of the latest information with respect to grades, varieties and other matters of general interest to producers.

High quality malting barley is, in many ways, comparable to high quality seed barley and for this reason, it must be considered as an 'elite' crop which demands special attention. More and more it has come to be realized that it is not enough to start with good seed of a suitable variety and to grow the crop carefully, following the best cultural practices and so on, unless extreme care is taken in the harvesting, threshing and handling of the resulting crop. With this in mind, a special section of this bulletin has been devoted to a discussion of these very important operations, the careful carrying out of which may mean the difference between success or failure in producing barley that is acceptable on a premium basis.

WINNIPEG, MANITOBA,
MARCH, 1957.

W. G. MALAHER, DIRECTOR,
RESEARCH DEPARTMENT,
SEARLE GRAIN COMPANY LTD.

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The Malting and Milling Industries

Domestic and Export Demands

The pattern of the past five years with respect to the production of barley in Western Canada and the demand that has existed for those types of barley suitable to the malting and milling trades, both in Canada and abroad, is of particular interest in considering the broad general picture.

During the past five seasons, Western Canada has grown an average annual crop of 242 million bushels of barley of which some 60% or 145 million bushels has consisted of the six-row varieties O.A.C. 21, Montcalm or Olli, all of which are suitable for malting. Another 12% of the total crop, or an average of close to 30 million bushels annually, has consisted of the two-row varieties, Hannchen and Compana, used in the pot and pearl barley and the milling trades. During the same period, deliveries averaged 124 million bushels of all types of barley of which some 28% or 35 million bushels found their way into the malting trade, either in Canada or the U.S.A. At the same time, an average of approximately 12%, or 15 million bushels, were absorbed annually by the domestic milling trade or were exported to Japan, where the barley was processed for human consumption.

It will be noted from these figures that an important part of the barley crop delivered at country elevators, roughly 40%, has in recent years been used for malting and milling either at home or abroad. This demand, both from the malting market and the human food market, is based primarily on quality considerations and it is, therefore, of the greatest importance that farmers should strive diligently to produce barley of a quality that will be acceptable to buyers in these markets. Only in this way, can the position of barley as an important source of cash farm income be protected.

Grading

Six-rowed domestic malting barleys in Western Canada have three statutory grades, namely, No. 1 C.W. 6-row, No. 2 C.W. 6-row and No. 3 C.W. 6-row, as defined in the Canada Grain Act. Similarly, the two-rowed varieties generally used in the milling industry where their large uniform kernels are favored for pearling, are identified with the two statutory grades No. 1 C.W. and No. 2 C.W. 2-row.

There are also specifications for various commercial grades which are established by the Committee on Western Grain Standards. These specifications are not permanent in nature but are designed to meet special conditions in any one crop year. For the crop year 1956-57, as related to malting and pearling quality, commercial grades include No. 4 C.W. 6-row and No. 3 C.W. 2-row. Present requirements for the grades mentioned both statutory and commercial, are as follows:

STATUTORY AND COMMERCIAL GRADES OF WESTERN BARLEY

(Related to Malting or Pearling Quality)

STANDARD OF QUALITY				MAXIMUM LIMITS OF FOREIGN MATERIAL				
Grade Name	Minimum Weight per Measured Bushel in Pounds	VARIETY	Minimum Percentage of Variety or Type	Degree of Soundness (See Note)	Seeds (See Note)	Wild Oats	Other Grains	Total Not to Exceed
No. 1 Canada Western Six-Row	50	Any Six-Row variety equal for malting purposes to O.A.C.21	95	Sound, well-matured, may contain slightly weather-stained kernels	Practically free	About ½%	About 1%	About 1%
No. 2 Canada Western Six-Row	48	Any Six-Row variety equal for malting purposes to O.A.C.21	90	Sound, reasonably well-matured may contain weather-stained, but not badly discoloured kernels	Practically free	About ½%	About 1½%	About 1½%
No. 3 Canada Western Six-Row	46	Any Six-Row variety of fair malting quality	85	Practically sound, reasonably well-matured, may contain weather-stained kernels	About 1%	About 1%	3%	4%
No. 4 Canada Western Six-Row	46	Any Six-Row variety of fair malting quality	85	Practically sound, may contain 8% peeled and broken kernels; weather - stained; reasonably well-matured	About 1%	About 1%	3%	4%
No. 1 Canada Western Two-Row	51	Any Two-Row variety equal for pearling or malting purposes to Canadian Thorpe	95	Sound, well-matured, may contain slightly weather-stained kernels	Practically free	About ½%	About 1%	About 1%
No. 2 Canada Western Two-Row	49	Any Two-Row variety equal for pearling or malting purposes to Canadian Thorpe	90	Sound, reasonably well-matured, may contain weather-stained, but not badly discoloured kernels	Practically free	About ½%	About 1½%	About 1½%
No. 3 Canada Western Two-Row	47	Any Two-Row variety of fair malting or pearling quality	85	Practically sound, may contain 8% peeled and broken kernels; weather - stained; reasonably well-matured	About 1%	About 1%	3%	4%

Sound—Shall mean practically free from frosted, free from sprouted or heated kernels, and shall be reasonably free from broken, skinned or otherwise damaged kernels.

Seeds— All grades shall be practically free of seeds and other material removable through a sieve with 4½/64-inch round perforations. The percentage tolerance of seeds specified in the grades shall refer to large seeds, such as wild buckwheat.

Grading Factors

Peeled and Broken Barley

GRADE	MAXIMUM PER CENT (Broken and Peeled Kernels)
1 C.W. Six-Row	3%
2 C.W. Six-Row	5%
3 C.W. Six-Row	5%
4 C.W. Six-Row	8%
1 C.W. Two-Row	3%
2 C.W. Two-Row	5%
3 C.W. Two-Row	8%

Varieties Qualifying for Specified Grades

For the crop year 1956-57, the following are the only varieties which qualify for the grades indicated:

No. 1 C.W. Six-Row No. 2 C.W. Six-Row	O.A.C. 21, Mensury, Olli, Manchurian, Montcalm, Gateway and Parkland.
No. 3 C.W. Six-Row No. 4 C.W. Six-Row	O.A.C. 21, Mensury, Olli, Manchurian, Montcalm, Gartons, Peatland, Kindred, Gateway and Parkland.
No. 1 C.W. Two-Row No. 2 C.W. Two-Row	Canadian Thorpe, Hannchen, and Charlottetown 80.
No. 3 C.W. Two-Row	Canadian Thorpe, Hannchen, Sanalta, Rex, Compana and Charlottetown 80.

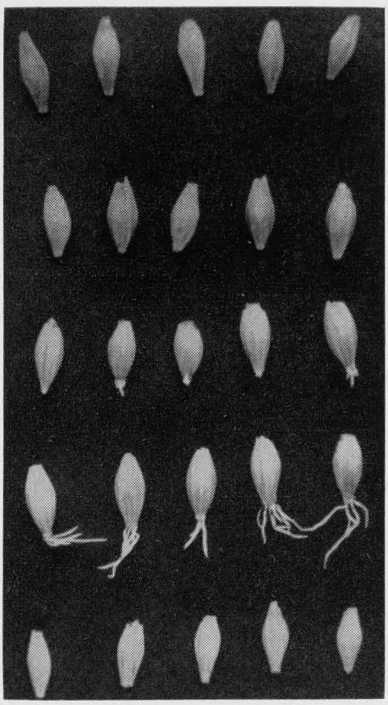
Quality Factors in Malting Barley

Barley which is to be used for the production of malt must meet certain quality standards and in some respects these are different and more exacting than for some other grains entering commercial channels. Before enumerating the qualities that are looked for by the maltster it will perhaps be helpful to give a very brief description of the malting process which will help the reader to understand more clearly the reasons for the high quality required in malting barley.

How Malt Is Produced

The malting process is a carefully controlled method of germinating barley during which certain chemical and physical changes take place within the kernel. The process referred to increases the activities of the enzymes, or digesting agents, which act upon the protein and starch within the kernel producing water-soluble starches and sugars. The barley is first steeped or soaked until the kernels have absorbed about 45 per cent moisture. Uniform vigorous germination is then necessary to bring about the conditions the maltster requires.

THE MALTING PROCESS



Raw Barley

Steeped Barley

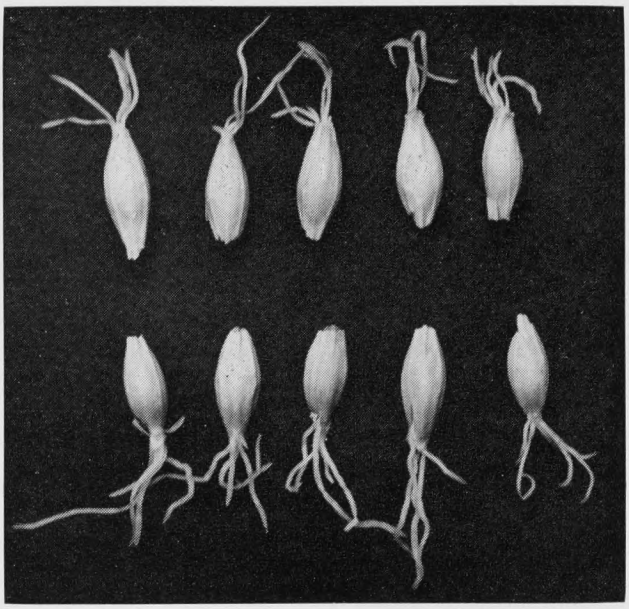
Chitted Barley
(with germ just beginning to emerge)

Fully Grown Malt
(germinated)

Malt

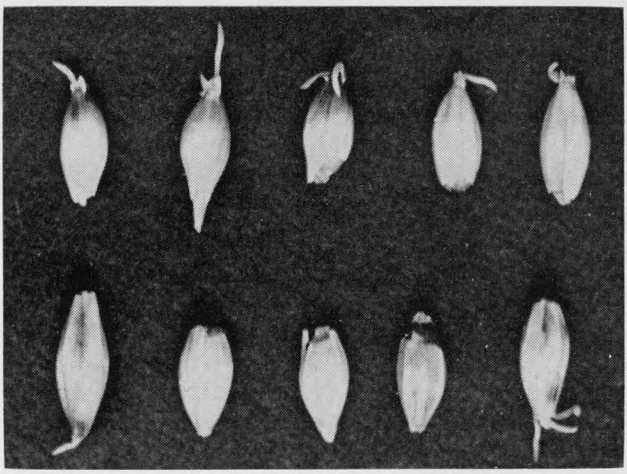
Growth is allowed to take place until all the kernels have produced short rootlets about three-quarters of an inch long and the sprouts have grown under the hull to almost its full length. The green malt is then dried rapidly and the rootlets are removed, the malt being stored for future use. The ker-

nels should be such that they will absorb sufficient water in the required steeping time and they should also all germinate at the same speed and have the same starch conversion time and so on.



Vigorous, uniform germination

Weak uneven germination



What the Maltster Requires

It will be realized from what has been said that only uniform, well-matured barley that is sound and free from damage of any kind will meet the requirements of the maltsters. Apart from the proper type, or variety, therefore, the various physical characteristics which the maltster looks for are as follows:

Plumpness:

Since fat, plump kernels contain a high percentage of starch and in turn manufacture into a malt with high extract, a short, plump barley is important.

Uniformity:

Uniform medium-sized kernels which have good hull adherence and good colour carry with them the requirements for satisfactory germination. Complete uniformity of size cannot be obtained in a six-row barley but the aim should be for the highest degree of uniformity possible.

Sound Barley:
Well matured and uniform.

Maturity:

Green immature samples do not modify readily on the malting floor. They will not germinate evenly and are more likely to have loose hulls and starch which is not well matured. Maturity is denoted by a fine wrinkle of the hull together with a bright, mature appearance.

Freedom from Weathering and Seed Borne Diseases:

Weathering in the field tends to lower germination and anything which tends to destroy the germinating power of barley reduces its value for malting purposes. For the same reason, good malting barley should be free of mildew and greying, smut and, of course, frost. Sprouting in the field is also undesirable since once a barley is sprouted it refuses to grow satisfactorily again.

Dryness:

Dry barley in Canada contains 14.8% moisture or less. Such barley can be stored and kept without going out-of-condition and since out-of-condition barley means lower germination, buyers look for dry barley so as to be sure that the germination has not been lowered due to the growth of often-times invisible mould growth.

Freedom From Threshing Damage:

Peeled or cracked kernels sprout fast because they take up water more rapidly and in addition the sprouts grow out of the breaks in the hull allowing the young shoots to be exposed and broken off when the germinating grain is stirred. This stops the conversion process in the kernel. Grain with injured ends, too, may not germinate; hence the quality of the malt will be lowered. The hull is required to provide drainage in the mash and it also protects the kernel and germ during the germination period. Thus, peeling of the kernels at the awn end, caused by poor threshing or cleaning, may allow the entry of moulds which may grow rapidly during malting and which may be detrimental. Freedom from undamaged kernels, therefore, is very important to the maltster.

Harvesting and Threshing Malting Barley

Many farmers, well located from the standpoint of producing malting barley, are able to grow barley that will measure up to all the requirements of the malting trade — until they harvest the crop. Then, because of faulty harvesting procedure or improper threshing, their otherwise good malting barley becomes damaged and, in many cases, drops to a feed grade. Although it is difficult to make an estimate of the total loss which occurs because of poor harvesting and threshing methods, it is considerable. From the standpoint of the individual, one has only to assume that if a certain combine threshes 1,000 bushels per day and causes mechanical damage to the grain which makes it unacceptable for malting this, at present day prices, would mean a loss of some $150.00. Such a loss would be due to the spread in price between malting barley and feed barley grades and loss of the malting premium.

Generally speaking, the losses referred to are due to: (1) cutting at the wrong stage of maturity, (2) faulty methods of swathing and (3) improper adjustments and rates of feeding the combine. These faulty practices will be discussed in order. Many of them seem to result either from failure to appreciate in the first place just what constitutes good malting barley or from failure during harvesting and threshing, to observe the proper precautions which are so necessary if the best possible sample is to be obtained.

Stage of Maturity

Because of the importance of maturity to the maltster who prefers a plump, mature kernel, the crop should not be harvested on the green side. Immature, lighter weight kernels, in fact, are not desirable in the malting process. Thus care should be taken to delay swathing until the kernels have turned in colour and the moisture content is down to somewhere between 30 and 35%. In the case of some of the older malting varieties which had a tendency to "shatter" or to "neck", particularly if the weather was dry or high winds prevailed, harvesting was often done on the green side — a practice which sometimes resulted in a considerable loss to the grower. With the introduction of Montcalm, Olli and Parkland, which do not shatter readily or have the same tendency to "neck", the crop may safely be left standing for a longer period of time in order to ripen.

Swathing

Experience has shown that swathing the crop is a safer method than straight combining, particularly if there are many green weeds in the field. It is important that the width of the swath be adjusted to the weight of the crop being harvested; thus a heavy crop may be placed in a wide swath while a light crop must be held together in a narrow swath. Careful adjustments are, therefore, needed to bring this about. The length of straw should be such that it will hold the swath up from the ground but it should not be so long that the weight of the swath collapses the stubble when it is resting on the ground. The grain should be permitted to complete drying and maturing in the swath until the kernels are a rich golden colour and the moisture content is close to 14.5%, or less. Tough or damp barley is not suitable for safe storage and will develop moulds which make it undesirable for malting purposes.

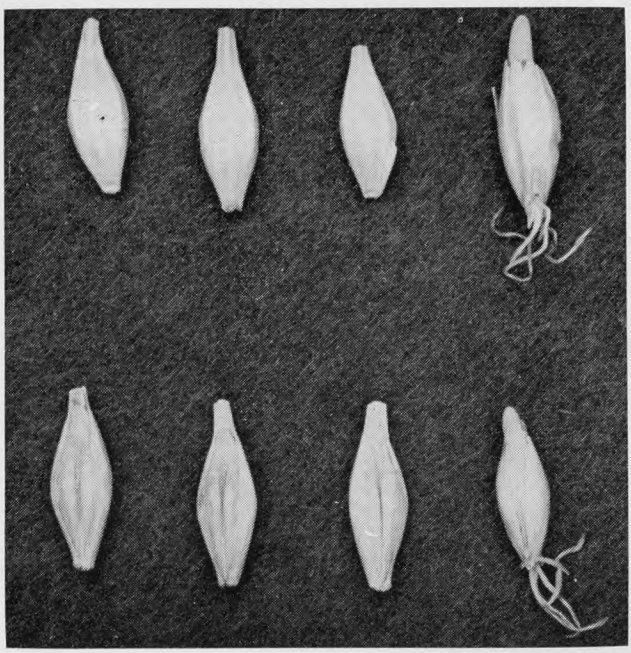
In normal dry weather, the barley should be ready to thresh from the swath in from 4 to 7 days after cutting. If the stand is too thin, to form a good swath, however, it will be better to leave the crop stand for straight combining since losses will be high and damage to the sample may result from a thin swath lying in contact with the ground.

Threshing

Before discussing some of the mechanical adjustments which are so important in the proper threshing of malting barley, a word should be said about general threshing conditions. As already mentioned, barley should not be combined or threshed before the moisture content of the kernel has been reduced by drying to 14.8% moisture or lower but damage through peeling or cracking of the hull may result if the straw and chaff are too dry. Many farmers thresh barley when they cannot thresh wheat or other grain, the

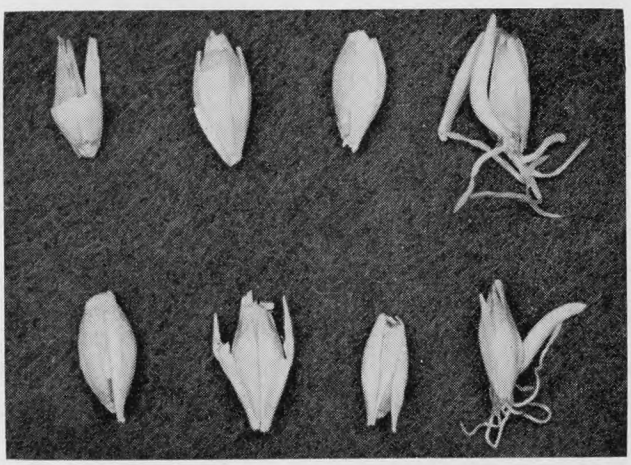
ideal time being in the early morning or late evening when the kernels are dry but when the chaff and straw may be slightly tough from dew. There is a danger, however, that when both straw and grain are too tough, the result will be a loss of grain or a high percentage of damaged kernels for the reason that it is necessary to run the cylinder at higher speeds to prevent clogging and the cylinder and concave clearances have to be set close to get the grain out of the heads. All makes and models of combines can be adjusted to do a good job of threshing barley but careful attention by the operator to the condition of grain and straw throughout the day is very important.

Many operators believe, wrongly, that malting barley must have a maximum weight per bushel and must, therefore, be threshed close to provide a clean sample, free of awns and chaff. While weight per bushel is important,



Left: Six properly threshed kernels with portion of awn attached (Long threshing).

Right: Two kernels during malting process. Sprout or acrospire is protected by the husk.



Left: Six skinned and broken kernels. (Too close threshing)

Right: Two kernels with sprout or acrospire not protected by husk during malting process.

absence from peeling is still more important. The most desirable kernel will have ⅛ to ¼ of an inch of awn attached so that there will not be the same danger of peeling and so that the kernel will be protected in subsequent handling.

It is sometimes difficult to obtain this ideal condition, particularly with Montcalm as the awn is inclined to be tough and the seed hull is brittle. Thus in attempting to remove too much of the awn, very often a portion of the hull is broken off which results in a cracked hull that is undesirable from the maltster's standpoint. Generally speaking, O.A.C. 21 and Olli thresh better than Montcalm for the reason that the awns are more brittle and, therefore, break more easily; at the same time the hulls on these varieties are more firmly attached to the kernels.

Feeding the Thresher or Combine

Feeding the machine evenly and at slightly below its normal capacity will assist the straw walkers and the fan blast at the chaffer to do a better job of separating and saving the grain. These precautions are particularly important with barley because the matting tendency of threshed barley straw, beards and chaff requires special attention so that the mass will be broken up to permit the proper separation of the kernels from the straw and chaff. Quite often threshing damage is done to barley by trying to force too large a volume of grain through a cylinder that is being operated at a lower speed than that used for threshing wheat.

Cylinder Speed

Authorities point out that most of the damage done to barley in the past has resulted either from over-threshing (already mentioned) or from too high

Good malting barley degraded to No. 1 Feed on account of broken or cracked kernels.

a cylinder speed, or both. Studies show that most of the samples containing high percentages of skinned and broken kernels have come from machines that were operating with cylinder bar speeds in excess of 6,000 feet per min-

ute and that speeds above 6,200 fpm will damage grain regardless of the concave clearance. It was also shown that it is possible to reduce the percentage of damaged kernels considerably by reducing the cylinder bar speed, sometimes by as much as 300 to 400 per minute.

PERCENT DAMAGED KERNELS AT VARIOUS CYLINDER SPEEDS

Cylinder Speed (22" Cylinder)	Concave Clearance	Skinned & Broken
RPM-FPM		
1150-6612		9.0%
1100-6325	3/8"	7.0%
1000-5750		6.0%
925-5268		4.8%

Source: "Threshing Barley for Malting Purposes" by S. L. Vogel, North Dakota Agricultural College, N.D.

In other words, the higher cylinder speed usually required for threshing wheat must be reduced considerably when barley is being handled. An effective and much more gentle threshing action can be obtained at reduced speeds which may sometimes go as low as 5,000 feet per minute (the equivalent of 870 to 930 revolutions per minute with a 22" diameter cylinder.)

Concave Adjustments

The space between the concaves and cylinder should be in the widest setting that will provide proper threshing. Concaves should not be set to take off all the awn or beard on the kernel to increase the test weight since clearances that are narrower than absolutely necessary, will result in over-threshing and kernel damage. Relation between concave clearance and cylinder speed is definite; that is, the lower the cylinder speed, the closer can be the clearance. Spike tooth concaves should be set down at least half way and the cylinder and concave teeth properly aligned. The rasp bar cylinders do the best job of threshing when the cylinder and concave clearance is set between 3/8 and 5/8 inches.

CYLINDER & CONCAVE ADJUSTMENTS

Type of Cylinder	Cylinder & Concave Clearance	Percent Broken & Skinned Kernels At Cylinder Surface Speeds of FPM 4700	5000	5800	6000	*Notes
RUBBER FACED BAR CYLINDER	3/4 inch	1.0		2.0		
	11/16 inch	1.0		2.0		
	5/8 inch	1.0		3.0		
	9/16 inch	1.0		3.3		
	1/2 inch	1.0		5.0		Best Speed: 5100 to 5200 FPM
	7/16 inch	1.5		6.0		
	3/8 inch	2.0		7.0		
	5/16 inch	3.0		9.0		
	1/4 inch	4.0		—		
RASP BAR CYLINDER	5/8 inch		2.0		3.2	
	9/16 inch		2.0		5.0	Best combination is approximately 5000 FPM and 3/8-1/2 inch clearance.
	1/2 inch		2.0		6.5	
	7/16 inch		2.3		8.0	
	3/8 inch		2.5		10.0	
	5/16 inch		3.0		12.0	
	1/4 inch		3.9		14.8	Best Speed: 5000 to 5100 FPM
	3/16 inch		5.0		17.5	
Spike Tooth	RANGE OF CLEARANCE 2-4 Rows (Half Way Up to All the Way Down)					Best Speed: 5600 to 5700 FPM

Controlled Tests of University of Minnesota Experiment Station.

** Based on North Dakota Field Tests.*

N.B. Because cylinder diameters vary, it is not practical to state cylinder speed in RPM. Thus the term FPM is used. This is the circumference of the cylinder in feet x RPM.

By examining grain frequently as the moisture conditions during the day change, it is possible to make adjustments as needed to keep damage to a minimum. Varying the concave clearances will usually take care of these changes throughout the day.

PERCENT DAMAGED KERNELS AT VARIOUS TIMES OF DAY

Time	Cylinder Speed (20" cylinder)	Concave Clearance	Skinned & Broken
10.00 AM			1.0%
11.00			1.0%
12.00	1050 RPM		1.0%
2.00	or	1/2"	1.6%
3.00	5701 FPM		2.0%
4.00			3.0%
5.00			4.5%

Source: "Threshing Barley for Malting Purposes" by S. L. Vogel, North Dakota Agricultural College, N. D.

Fan and Sieve Adjustments

The fan should be operated at the same speed as for threshing wheat and the air valves should be opened fairly wide to provide a strong wind blast. The wind boards should direct the air blast to the front 1/3 of the shoe sieve and chaffer so that all grain and chaff are lifted clear of the chaffer sieve and so that the heavier barley kernels will fall on a clean chaffer sieve and pass through it easily. The adjustable chaffer sieve should be opened to about the 2/3 open position to allow plenty of air blast to pass through. More barley is lost by using too little wind than by using too much.

Sieves should be adjusted for the the least possible return since a great deal of damage occurs on machines that are running with a heavy return. Where the latter situation occurs, a number of kernels are going through the cylinder a second time, thereby increasing the number of skinned kernels. Authorities suggest that it is much better to plan on cleaning the grain with a fanning mill after threshing than to attempt to clean it too closely in the threshing operation. It sometimes happens that barley with short beards will not pass readily through the cleaning sieve and a heavy return results. This problem can be overcome on the round hold sieve by placing retarder cross slats on top of the sieve to set the barley up on end, two or three cross slats with a rounded top surface about one half inch in height usually serving the purpose. Adjustable sieves may be opened wider and usually present fewer difficulties than the round hole types.

Operators using grain blowers should observe some precautions. Blowers can do considerable damage when run at a high speed but when run at the recommended speed little or no damage occurs. Many blower type elevators are run by a farm tractor, the best pully speed of which is usually too high at full throttle. Thus many farmers who have not checked the fan speed may be operating this equipment at speeds in excess of specifications, causing additional damage to the grain. Blower elevators may also cause cracking when not running at full capacity. Unless, therefore, the operator is prepared to take the special precautions discussed above concerning blower elevators, it is safer to use another type.

Handling After Threshing

If the barley has been properly threshed, later handling does not seem to damage the grain appreciably. However, if the barley has been damaged in threshing, it has been found that it becomes progressively worse every time it is handled. Thus, barley that comes from the threshing machine with say 3% to 4% of damaged kernels may well end up at its destination with two or three times that percentage of kernels that have become either peeled or broken. A little extra care given during threshing and harvesting, therefore, will pay handsome dividends.

Marketing Barley Through the Country Elevator

The farmer who intends to ship a carload of malting barley over the quota must first have his sample accepted either by an exporter or a malting company. It is important, therefore, to secure a **representative** sample for forwarding through the elevator agent, **as early as possible.**

The Usual Procedure

The usual sequence of events is that the agent retains a portion of the sample as a check to make sure that deliveries applying on the carload are up to the original sample. The balance of the sample he forwards to his head office who, in turn, submits the sample to the exporter and/or malting company. If the sample is accepted, head office immediately applies to the Canadian Wheat Board for a permit for the farmer to deliver and ship a carlot of barley as represented by the sample. Upon arrival in Winnipeg the car is sampled and inspected by the Inspection Department of the Board of Grain Commissioners. This official sample is checked by the Company that has accepted the representative sample of the carlot. If the barley is equal to the sample, the car proceeds to its destination and upon unload, settlement is made basis the government unload grade and dockage plus the 5c malting premium.

Some Problems That Arise

It sometimes happens, however, that through the farmer's anxiety to market the crop as quickly as possible, samples may be submitted from the first grain threshed and these may not represent the true quality of the entire field or the resulting carlot that is shipped to the malting company at a later date. The reasons for this may be beyond the farmer's control as, for example, subsequent frost damage or adverse harvesting conditions, or they may be due to variations of quality in the field or damaged barley resulting from improper threshing and handling. Whatever the reason, if the grain is affected to the point that it is no longer acceptable on a premium basis because the barley shipped is not of the same colour, appearance or quality as the original sample, it will be turned down and will become the farmer's responsibility so far as storage is concerned, applying against future deliveries on his quota. Fortunately, in a normal year, this situation rarely occurs. If it does so happen that the first sample of malting barley forwarded is turned down, the elevator agent who submitted it should continue to send to head office, from time to time, samples of the barley in case marketing conditions change, in which case it may be accepted at a later date.

Barley Improvement Work

Plant Breeding and Variety Evaluation

No bulletin dealing with the production of malting barley in Western Canada would be complete without some reference, however brief, to the contribution that has been made toward the improvement of barley as a special commercial crop and the development, through selection, plant breeding and evaluation, of those varieties which have come to occupy a prominent place in the malting barley program.

To this end many individual plant breeders, pathologists and others working at the various Experimental Farms, Universities and Laboratories across Canada have, over the past half century, contributed in full measure. Nor would the story of barley improvement in Canada be complete without reference to the important part played by the malting chemists in the employ of malting companies, the government and the universities.

Early work on malting barley varieties was started by Professor T. J. Harrison at the University of Manitoba. Considerable expansion of this program took place when the National Research Council organized a Barley Research Laboratory in Ottawa in 1935. From then on, for some years, most of the Canadian research on malting barley was done under the direction of the National Research Council. In 1942, however, the Malting Barley Laboratory was moved from Ottawa and the work was handed over to the Grain Research Laboratory of the Board of Grain Commissioners. Later in 1948, the Barley Improvement Institute (now the Brewing and Malting Barley Research Institute) was organized by the malting and processing industries and this body proceeded to work very closely with the Grain Research Laboratory, as well as with the Experimental Farms Branch in an expanded program of fundamental research and the assessment of quality and of varieties.

—Courtesy Experimental Farm, Brandon.

TRIAL PLOTS OF BARLEY
Showing Superior Straw Strength Parkland (left foreground) Compared with Montcalm (right foreground)

Malting laboratories, which were first engaged in studies on the quality of existing varieties, later turned their attention to prediction tests which

gave the plant breeder valuable and necessary information on the quality of the material with which he was working and enabled him to detect promising lines or to discard lines that were unsuitable. A still more recent development has been the organization of the pilot processing laboratory in Winnipeg (to be opened in 1957) for the evaluation of the brewing quality of varieties. The new laboratory will speed up the whole process of evaluation, which is considered so important if the greatest progress in plant breeding and the development of new and suitable varieties is to be made.

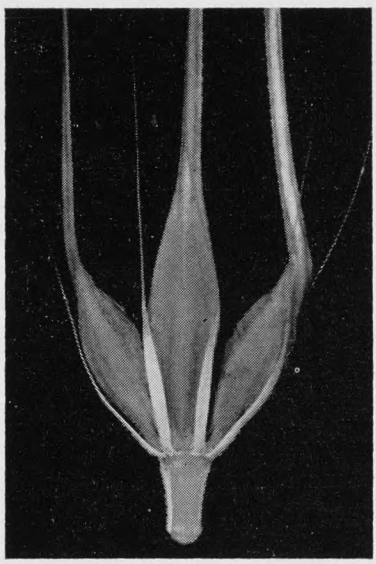
This, then, is a brief outline of some of the work that lies behind the production of our varieties of malting barley some of the more important of which are described below:

Malting Barley Varieties

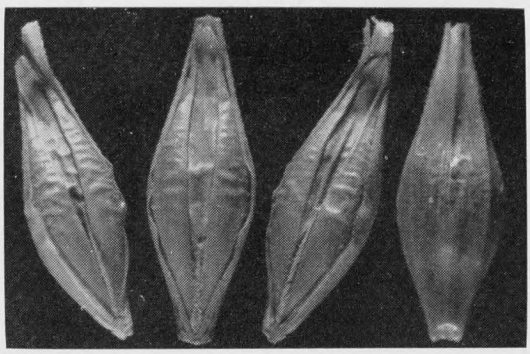
Aside from **O.A.C. 21** which is the standard of quality for the top six-rowed grades, varieties eligible for acceptance by maltsters, on an equivalent quality basis, are: **Montcalm, Olli, Gateway** and **Parkland.** A brief description of each of these varieties follows:

O.A.C. 21

A six-rowed, rough-awned barley developed from a selection made at the Ontario Agricultural College and first brought to Western Canada about 1912. This variety fast became the most popular one in Canada and at one time was grown almost to the exclusion of all other varieties.



O.A.C. 21

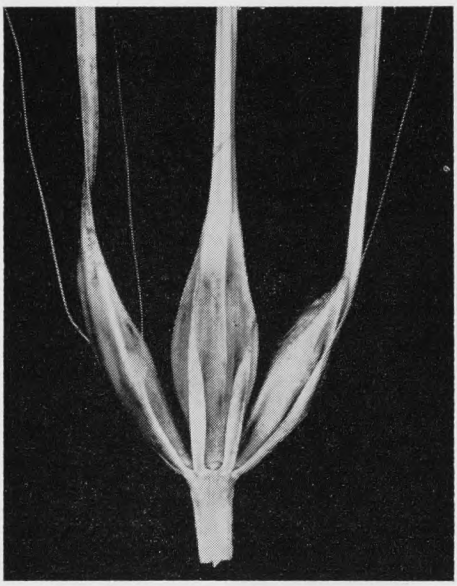


O.A.C. 21 is a blue aleurone variety. It has a nodding head and when ripe, has a tendency to "neck", that is, to break at the neck about 3 to 6

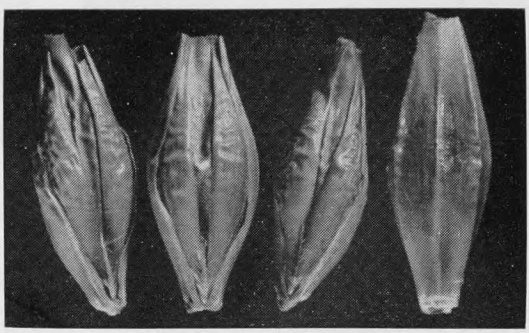
inches below the head. In dry, windy weather, considerable loss takes place if the grain is allowed to become properly ripened. It has a moderately stiff straw, is quite susceptible to stem rust, but is quite resistant to both loose and other smuts. This variety, as the standard for all malting varieties, is sought after by the malting trade. The acreage devoted to O.A.C. 21, however, is now limited although the variety is still grown in scattered areas in all three prairie provinces.

MONTCALM

A six-rowed, smooth-awned variety developed from a cross made at Macdonald College, Quebec, and released to growers and licensed for sale in Canada in 1945. Montcalm was recommended for all areas where O.A.C. 21 had been the predominant variety and, for some years, it has been the main variety grown for malting in Western Canada, particularly in Manitoba and Saskatchewan.



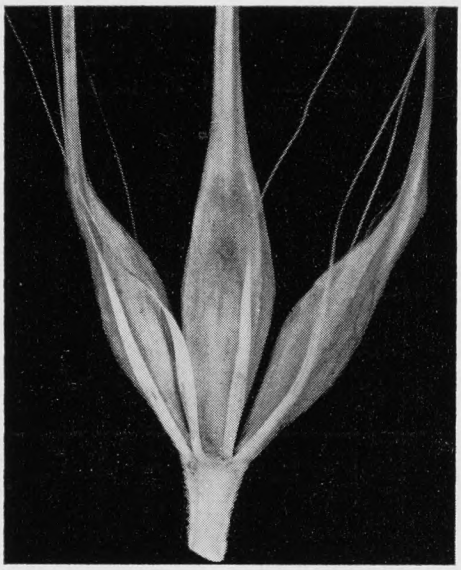
MONTCALM



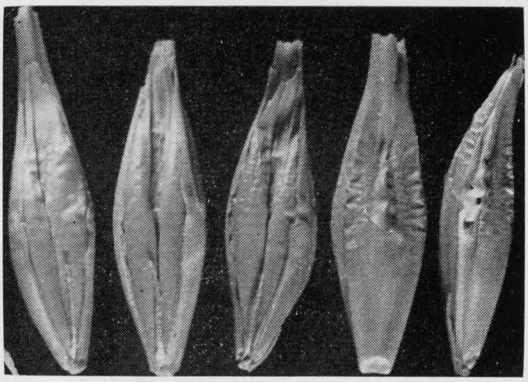
Montcalm is a blue aleurone variety and outside of its smooth-awn, it is, in many respects, quite similar to O.A.C. 21. The straw is moderately strong and it is not as subject to "necking" as O.A.C. 21. It is somewhat more difficult to thresh in that it peels more easily and portions of the rachis adhere to the kernel causing a larger loss in cleaning before maturing. It is not rust resistant and it is more susceptible to smut than O.A.C. 21. Under normal conditions, it yields several bushels more per acre and gives 1 to 2% higher extract than O.A.C. 21. Manitoba Variety Recommendations for 1957 show Montcalm, coupled with O.A.C. 21, as second choice for practically all crop districts, and in Saskatchewan, this variety is one of the recommended varieties for the extreme north-central and north-eastern parts of the province.

OLLI

A six-rowed, rough-awned barley developed at the Central Experimental Farm, Ottawa, from a plant selection introduced in 1930. This variety was released for growing is 1936 and was licensed for sale in Canada the same year. Olli is a popular variety in northern and central Alberta where it is accepted for malting and is used in considerable quantities by the trade.



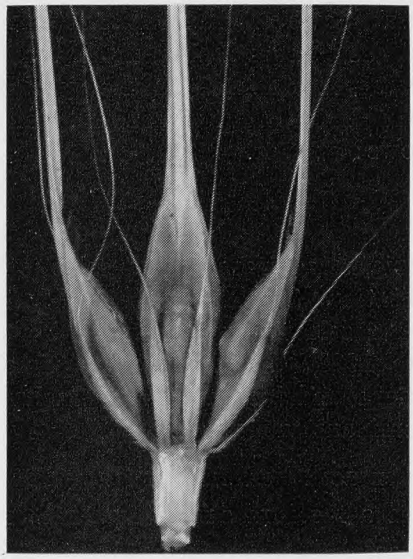
OLLI



The variety Olli contains an aleurone that is predominantly blue with white grains invariably present. It has an early erect growth, moderately stiff straw and is tolerably resistant to smut. This variety has a tendency to shed its awns and to partially tear back the hull. Normally, however, the hull is quite tight. It is generally about two weeks earlier than O.A.C. 21. In the high altitude, short season area of Alberta it produces a large plump kernel with a very high extract. In other regions, particularly in Saskatchewan and Manitoba, however, it produces a "shoepeg" type of kernel which is not wanted by the malting industry. Alberta Variety Recommendations for 1957 show Olli as being suitable for the central and northern areas of the province, as well as for part of the Foothills area further south.

PARKLAND

A six-rowed smooth-awned barley resulting from a cross made at the Experimental Farm, Brandon, in 1946. This variety was licensed for sale in Canada in 1956. It has proved to be widely adapted and has generally yielded more than O.A.C. 21 and Montcalm.

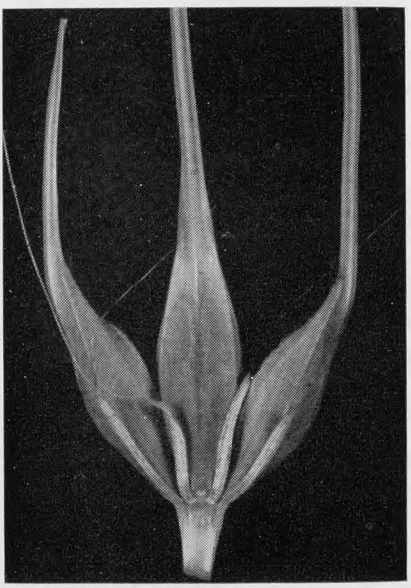


PARKLAND

Parkland is a blue aleurone variety. The straw is of medium length and moderately strong and the variety appears to be more resistant to lodging than either Montcalm or O.A.C. 21. It possesses a high degree of resistance to the prevailing races of stem rust but is moderately susceptible to smut. 1957 Variety Recommendations for both Manitoba and Saskatchewan show Parkland for all areas where Montcalm was previously the standard variety. In Alberta there is not sufficient data as yet as to its regional adaptibility and for this reason, the variety is not on the recommended list of malting barleys for 1957.

GATEWAY

A six-rowed smooth-awned barley from a cross made at the University of Alberta. This variety was licensed for sale in Canada in 1953. Although it is classed as being equal to O.A.C. 21 in malting quality and it is now included in the malting grades, it has not as yet been accepted too readily by the malting and brewing industries who are conducting further plant scale tests to determine its malting and brewing qualities.



GATEWAY

Gateway is a white aleurone variety that is earlier than Olli from which it is derived and which it has outyielded on the black soil areas of Alberta and in many tests on the grey wooded soils. It is short to mid-tall in the straw and it is also moderately susceptible to smut. The variety appears to be best adapted to central and northern Alberta where it is on the recommended list for 1957.

Milling Varieties of Barley

The standard of quality for the top two-rowed grades of barley is **Canadian Thorpe,** an old-time variety now seldom grown. From the standpoint of the pot and pearling and the milling industries, however, the two most important varieties are **Hannchen** and **Compana,** the former being in demand at home for pot and pearling and the latter being in demand in the special export market to Japan where barley is processed for human consumption. A brief description of these two varieties follows:

HANNCHEN

A rough-awned, two-rowed variety which originated from a plant selection made from "Hanna" at the Plant Breeding Station, Svalof, Sweden. Most of the Hannchen grown in Canada comes from a selection made by the University of Saskatchewan, and licensed prior to 1923. At the present time Hannchen is grown fairly extensively in Northern and North Central Saskatchewan where, in some areas, it is the predominant variety.

Hannchen produces medium plump, shallow-creased kernels with a yellow aleurone. The head is lax and nodding. It has a medium stiff straw and is considered moderately resistant to stripe disease.

COMPANA

A smooth-awned, two-rowed variety released in the U.S.A. in 1941 and later licensed for sale in Canada, where it seems quite well adapted in the drier, non-irrigated lands of Southern Alberta and Southwestern Saskatchewan.

Compana produces a fairly plump kernel with a yellow aleurone. It has a lax head, erect to slightly nodding. It is considered resistant to loose smut and moderately resistant to covered smut and is said to be less susceptible to grasshopper damage. It is moderately early in maturity but is inclined to be weak in the straw.

Some Special Considerations

It is not the purpose of this bulletin to refer to the cultural practices, methods of weed control, diseases and other matters relating to the growing of the barley crop. These matters have all been dealt with very fully in various other publications that have appeared from time to time. Several accepted practices which go hand in hand with the successful raising of 'quality barley', however, should perhaps be mentioned briefly here. These include:

1. The Use of Pure Seed

The use of high quality seed that is true to variety cannot be over-emphasized. Registered and Certified seed of the approved varieties is readily

available. This seed carries with it the stamp of approval of the Canadian Seed Growers' Association and of the Plant Products Division of the Canada Department of Agriculture.

2. The Advisability of Seeding Early.

Barley sown reasonably early in the season does better, on the average, than that which is sown late.

3. Advisability of Shallow Seeding

Provided the barley is sown in a firm seedbed and is in contact with moisture, shallow seeding means a quicker emergence, a more uniform stand, healthier seedlings and, everything else being equal, a higher yielding crop.